

SEQUENCE LISTING

<110> Anderson, Marie
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 Folmer, Rutger
 Lindqvist, Thomas
 Xue, Yafeng
 Newton, David
 Kern, Gunther

<120> CRYSTAL STRUCTURE OF GLUTAMATE RACEMASE (MURI)

<130> 100966

<140> 10/729,571
 <141> 2003-05-12

<150> US 60/435,087
 <151> 2002-12-20

<150> US 60/435,527
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<150> US 60/435,167
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<150> US 60/435,272
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<160> 97

<170> PatentIn version 3.3

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 <213> Staphylococcus aureus

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<210> 2
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<223> Xaa can be any naturally occurring amino acid

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Lys Ser Leu Leu Lys Ala Arg Leu Phe Asp Glu Ile Ile Tyr Tyr Gly
20 25 30

Asp Ser Ala Arg Val Pro Tyr Gly Thr Lys Asp Pro Thr Thr Ile Lys
35 40 45

Gln Phe Gly Leu Glu Ala Leu Asp Phe Phe Lys Pro His Glu Ile Glu
50 55 60

Leu Leu Ile Val Ala Cys Asn Thr Ala Ser Ala Leu Ala Leu Glu Glu
65 70 75 80

Met Gln Lys Tyr Ser Lys Ile Pro Ile Val Gly Val Ile Glu Pro Ser
85 90 95

Ile Leu Ala Ile Lys Arg Gln Val Glu Asp Lys Asn Ala Pro Ile Leu
100 105 110

Val Leu Gly Thr Lys Ala Thr Ile Gln Ser Asn Ala Tyr Asp Asn Ala
115 120 125

Leu Lys Gln Gln Gly Tyr Leu Asn Ile Ser His Leu Ala Thr Ser Leu
130 135 140

Phe Val Pro Leu Ile Glu Glu Ser Ile Leu Glu Gly Glu Leu Leu Glu
145 150 155 160

Thr Cys Met His Tyr Tyr Phe Thr Pro Leu Glu Ile Leu Pro Glu Val
165 170 175

Ile Ile Leu Gly Cys Thr His Phe Pro Leu Ile Ala Gln Lys Ile Glu
180 185 190

Gly Tyr Phe Met Gly His Phe Ala Leu Pro Thr Pro Pro Leu Leu Ile
195 200 205

His Ser Gly Asp Ala Ile Val Glu Tyr Leu Gln Gln Lys Tyr Ala Leu

210

215

220

Lys Asn Asn Ala Cys Thr Phe Pro Lys Val Glu Phe His Ala Ser Gly
 225 230 235 240

Asp Val Ile Trp Leu Glu Arg Gln Ala Lys Glu Trp Leu Lys Leu Xaa
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 <223> Xaa can be any naturally occurring amino acid
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Met Lys Ile Gly Val Phe Asp Ser Gly Val Gly Gly Phe Ser Val Leu
1 5 10 15

Lys Ser Leu Leu Lys Ala Gln Leu Phe Asp Glu Ile Ile Tyr Tyr Gly
20 25 30

Asp Ser Ala Arg Val Pro Tyr Gly Thr Lys Asp Pro Thr Thr Ile Lys
35 40 45

Gln Phe Gly Leu Glu Ala Leu Asp Phe Phe Lys Pro His Gln Ile Glu
50 55 60

Leu Leu Ile Val Ala Cys Asn Thr Ala Ser Ala Leu Ala Leu Glu Glu
65 70 75 80

Met Gln Lys His Ser Lys Ile Pro Ile Val Gly Val Ile Glu Pro Ser
85 90 95

Ile Leu Ala Ile Lys Gln Gln Val Lys Asp Lys Asn Ala Pro Ile Leu
100 105 110

Val Leu Gly Thr Lys Ala Thr Ile Gln Ser Asn Ala Tyr Asp Asn Ala
115 120 125

Leu Lys Gln Gln Gly Tyr Leu Asn Val Ser His Leu Ala Thr Ser Leu
130 135 140

Phe Val Pro Leu Ile Glu Glu Ser Ile Leu Glu Gly Glu Leu Leu Glu
145 150 155 160

Thr Cys Met Arg Tyr Tyr Phe Thr Pro Leu Lys Ile Leu Pro Glu Val
165 170 175

Ile Ile Leu Gly Cys Thr His Phe Pro Leu Ile Ala Gln Lys Ile Glu
180 185 190

Gly Tyr Phe Met Glu His Phe Ala Leu Pro Thr Pro Pro Leu Leu Ile
195 200 205

His Ser Gly Asp Ala Ile Val Glu Tyr Leu Gln Gln Lys Tyr Ala Leu
210 215 220

Lys Asn Asn Ala His Ala Phe Pro Lys Val Glu Phe His Ala Ser Gly

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235

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 ctttcaacac cccccctact catccattcg ggcgatgcta ttgtaggata ttgcagcaa 660
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<211> 256

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<213> *Helicobacter pylori*

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<223> Xaa can be any naturally occurring amino acid

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Met Lys Ile Gly Val Phe Asp Ser Gly Val Gly Gly Phe Ser Val Leu
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Lys Ser Leu Leu Lys Ala Gln Leu Phe Asp Glu Ile Ile Tyr Tyr Gly
20 25 30

Asp Ser Ala Arg Val Pro Tyr Gly Thr Lys Asp Pro Thr Thr Ile Lys
35 40 45

Gln Phe Gly Leu Glu Ala Leu Asp Phe Phe Lys Pro His Gln Ile Glu
50 55 60

Leu Leu Ile Val Ala Cys Asn Thr Ala Ser Ala Leu Ala Leu Glu Glu
65 70 75 80

Met Gln Lys His Ser Lys Ile Pro Ile Val Gly Val Ile Glu Pro Ser
85 90 95

Ile Leu Ala Ile Lys Arg Gln Val Lys Asp Lys Asn Ala Pro Ile Leu
100 105 110

Val Leu Gly Thr Lys Ala Thr Ile Gln Ser Asn Ala Tyr Asp Asn Ala
115 120 125

Leu Lys Gln Gln Gly Tyr Leu Asn Val Ser His Leu Ala Thr Ser Leu
130 135 140

Phe Val Pro Leu Ile Glu Glu Ser Ile Leu Glu Gly Glu Leu Leu Glu
145 150 155 160

Thr Cys Met Arg Tyr Tyr Phe Thr Pro Leu Lys Ile Leu Pro Glu Val
165 170 175

Ile Ile Leu Gly Cys Thr His Phe Pro Leu Ile Ala Gln Lys Ile Glu
180 185 190

Gly Tyr Phe Met Glu His Phe Ala Leu Ser Thr Pro Pro Leu Leu Ile
195 200 205

His Ser Gly Asp Ala Ile Val Gly Tyr Leu Gln Gln Lys Tyr Ala Leu
210 215 220

Lys Lys Asn Ala His Ala Phe Pro Lys Val Glu Phe His Ala Ser Gly
225 230 235 240

Asp Val Ile Trp Leu Glu Lys Gln Ala Lys Glu Trp Leu Lys Leu Xaa

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 <213> *Helicobacter pylori*

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Lys Ser Leu Leu Lys Ala Gln Leu Phe Asp Glu Ile Ile Tyr Tyr Gly
 20 25 30

Asp Ser Ala Arg Val Pro Tyr Gly Thr Lys Asp Pro Thr Thr Ile Lys
 35 40 45

Gln Phe Gly Leu Glu Ala Leu Asp Phe Phe Lys Pro His Gln Ile Lys
 50 55 60

Leu Leu Ile Val Ala Cys Asn Thr Ala Ser Ala Leu Ala Leu Glu Glu
65 70 75 80

Met Gln Lys His Ser Lys Ile Pro Ile Val Gly Val Ile Glu Pro Ser
85 90 95

Ile Leu Ala Ile Lys Gln Gln Val Lys Asp Lys Asn Ala Pro Ile Leu
100 105 110

Val Leu Gly Thr Lys Ala Thr Ile Gln Ser Asn Ala Tyr Asp Asn Ala
115 120 125

Leu Lys Gln Gln Gly Tyr Leu Asn Val Ser His Leu Ala Thr Ser Leu
130 135 140

Phe Val Pro Leu Ile Glu Glu Ser Ile Leu Gly Gly Glu Leu Leu Glu
145 150 155 160

Thr Cys Met Arg Tyr Tyr Phe Thr Pro Leu Lys Ile Leu Pro Glu Val
165 170 175

Ile Ile Leu Gly Cys Thr His Phe Pro Leu Ile Ala Gln Lys Ile Glu
180 185 190

Gly Tyr Phe Met Glu His Phe Ala Leu Ser Thr Pro Pro Leu Leu Ile
195 200 205

His Ser Gly Asp Ala Ile Val Glu Tyr Leu Gln Gln Lys Tyr Ala Leu
210 215 220

Lys Lys Asn Ala His Ala Phe Pro Lys Val Glu Phe His Ala Ser Gly
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Asp Val Ile Trp Leu Glu Lys Gln Ala
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<212> DNA

<213> Helicobacter pylori

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 <223> Xaa can be any naturally occurring amino acid

<400> 10

Met Lys Ile Gly Val Phe Asp Ser Gly Val Gly Gly Phe Ser Val Leu
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Lys Ser Leu Leu Lys Ala Gln Leu Phe Asp Glu Ile Ile Tyr Tyr Gly
 20 25 30

Asp Ser Ala Arg Val Pro Tyr Gly Thr Lys Asp Pro Thr Thr Ile Lys
 35 40 45

Gln Phe Gly Leu Glu Ala Leu Asp Phe Phe Lys Pro His Gln Ile Gly
 50 55 60

Leu Leu Ile Val Ala Cys Asn Thr Ala Ser Ala Leu Ala Leu Glu Glu
 65 70 75 80

Met Gln Lys His Ser Lys Ile Pro Ile Val Gly Val Ile Glu Pro Ser
85 90 95

Ile Leu Ala Ile Lys Gln Gln Val Lys Asp Lys Asn Ala Ser Ile Leu
100 105 110

Val Leu Gly Thr Lys Ala Thr Ile Gln Ser Asn Ala Tyr Asp Asn Ala
115 120 125

Leu Lys Gln Gln Gly Tyr Leu Asn Val Ser His Leu Ala Thr Ser Leu
130 135 140

Phe Val Pro Leu Ile Glu Glu Ser Ile Leu Glu Gly Glu Leu Leu Glu
145 150 155 160

Thr Cys Met Arg Tyr Tyr Phe Thr Pro Leu Glu Ile Leu Pro Glu Val
165 170 175

Val Ile Leu Gly Cys Thr His Phe Pro Leu Ile Ala Gln Lys Ile Glu
180 185 190

Gly Tyr Phe Met Glu His Phe Ala Leu Ser Thr Pro Pro Leu Leu Ile
195 200 205

His Ser Gly Asp Ala Ile Val Glu Tyr Leu Gln Gln Lys Tyr Ala Leu
210 215 220

Lys Lys Asn Ala His Ala Phe Pro Lys Val Glu Phe His Ala Ser Gly
225 230 235 240

Asp Val Ile Trp Leu Glu Lys Gln Ala Lys Glu Trp Leu Lys Leu Xaa
245 250 255

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<213> Helicobacter pylori

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caccagatta aattattgat tgtggcatgc aacacagcga gcgctctagc tttagaagag 240
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 cttccaaccc cccccctact catccattcg ggcgatgcta ttgtagaata ttgcagcaa 660
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 <213> *Helicobacter pylori*

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 20 25 30

Asp Ser Ala Arg Val Pro Tyr Gly Thr Lys Asp Pro Thr Thr Ile Lys
 35 40 45

Gln Phe Gly Leu Glu Ala Leu Asp Phe Phe Lys Pro His Gln Ile Lys
 50 55 60

Leu Leu Ile Val Ala Cys Asn Thr Ala Ser Ala Leu Ala Leu Glu Glu
 65 70 75 80

Met Gln Lys His Ser Lys Ile Pro Ile Val Gly Val Ile Glu Pro Ser
 85 90 95

Ile Leu Ala Ile Lys Gln Gln Val Lys Asp Lys Asn Ala Pro Ile Leu
 100 105 110

Val Leu Gly Thr Lys Ala Thr Ile Gln Ser Asn Ala Tyr Asp Asn Ala
115 120 125

Leu Lys Gln Gln Gly Tyr Leu Asn Ile Ser His Leu Ala Thr Ser Leu
130 135 140

Phe Val Pro Leu Ile Glu Glu Ser Ile Leu Glu Gly Glu Leu Leu Glu
145 150 155 160

Thr Cys Met Arg Tyr Tyr Phe Thr Pro Leu Lys Ile Leu Pro Glu Val
165 170 175

Ile Ile Leu Gly Cys Thr His Phe Pro Leu Ile Ala Gln Lys Ile Glu
180 185 190

Gly Tyr Phe Met Glu His Phe Ala Leu Pro Thr Pro Pro Leu Leu Ile
195 200 205

His Ser Gly Asp Ala Ile Val Glu Tyr Leu Gln Gln Lys Tyr Thr Leu
210 215 220

Lys Lys Asn Ala His Ala Phe Pro Lys Val Glu Phe His Ala Ser Gly
225 230 235 240

Asp Val Val Trp Leu Glu Lys Gln Ala
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 aaatacgccc ttaagaaaaa tgcacactca ttccctaaag tggaatttca tgcgagcggc 720
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 20 25 30

Asp Ser Ala Arg Val Pro Tyr Gly Thr Lys Asp Pro Thr Thr Ile Lys
 35 40 45

Gln Phe Gly Leu Glu Ala Leu Asp Phe Phe Lys Pro His Gln Ile Gly
 50 55 60

Leu Leu Ile Val Ala Cys Asn Thr Ala Ser Ala Leu Ala Leu Glu Glu
 65 70 75 80

Met Gln Lys His Ser Lys Ile Pro Ile Val Gly Val Ile Glu Pro Ser
 85 90 95

Ile Leu Ala Ile Lys Gln Gln Val Lys Asp Lys Asn Ala Pro Ile Leu
 100 105 110

Val Leu Gly Thr Lys Ala Thr Ile Gln Ser Asn Ala Tyr Asp Asn Ala
 115 120 125

Leu Lys Gln Gln Gly Tyr Leu Asn Val Ser His Leu Ala Thr Ser Leu
130 135 140

Phe Val Pro Leu Ile Glu Glu Asn Ile Leu Glu Gly Glu Leu Leu Glu
145 150 155 160

Thr Cys Met Arg Tyr Tyr Phe Thr Pro Leu Lys Ile Leu Pro Glu Val
165 170 175

Ile Ile Leu Gly Cys Thr His Phe Pro Leu Ile Ala Gln Lys Ile Glu
180 185 190

Gly Tyr Phe Met Glu His Phe Ala Leu Leu Thr Pro Pro Leu Leu Ile
195 200 205

His Ser Gly Asp Ala Ile Val Glu Tyr Leu Gln Gln Lys Tyr Ala Leu
210 215 220

Lys Lys Asn Ala His Ser Phe Pro Lys Val Glu Phe His Ala Ser Gly
225 230 235 240

Asp Val Ile Trp Leu Glu Lys Gln Ala Lys Glu Trp Leu Lys Leu Xaa
245 250 255

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<213> Helicobacter pylori

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 <223> Xaa can be any naturally occurring amino acid

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Asp Ser Ala Arg Val Pro Tyr Gly Thr Lys Asp Pro Thr Thr Ile Lys
 35 40 45

Gln Phe Gly Leu Glu Ala Leu Asp Phe Phe Lys Pro His Gln Ile Glu
 50 55 60

Leu Leu Ile Val Ala Cys Asn Thr Ala Ser Ala Leu Ala Leu Glu Glu
 65 70 75 80

Met Gln Lys His Ser Lys Ile Pro Ile Val Gly Val Ile Glu Pro Ser
 85 90 95

Ile Leu Ala Ile Lys Gln Gln Val Lys Asp Lys Asn Ala Pro Ile Leu
 100 105 110

Val Leu Gly Thr Lys Ala Thr Ile Gln Ser Asn Ala Tyr Asp Asn Ala
 115 120 125

Leu Lys Gln Gln Gly Tyr Leu Asn Val Ser His Leu Ala Thr Ser Leu
 130 135 140

Phe Val Pro Leu Ile Glu Glu Ser Ile Leu Glu Gly Glu Leu Leu Glu
145 150 155 160

Thr Cys Met Arg Tyr Tyr Phe Thr Pro Leu Lys Ile Leu Pro Lys Val
165 170 175

Ile Ile Leu Gly Cys Thr His Phe Pro Leu Ile Ala His Gln Ile Lys
180 185 190

Gly Tyr Phe Met Gly His Phe Ala Leu Ser Thr Pro Pro Leu Leu Ile
195 200 205

His Ser Gly Asp Ala Ile Val Gly Tyr Leu Gln Gln Lys Tyr Ala Leu
210 215 220

Lys Lys Asn Ala His Ala Phe Pro Lys Val Glu Phe His Ala Ser Gly
225 230 235 240

Asp Val Ile Trp Leu Glu Lys Gln Ala Lys Glu Trp Leu Lys Leu Xaa
245 250 255

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<212> DNA
<213> Helicobacter pylori

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gccacttccc tttttgtgcc tttgattgaa gaaagtattt tagaggcgga attgtagtaa 480
acttgcattc gttattattt cactccctta aagattttac ctgaagtgat catttttaggt 540
tgtacgcatt ttcccttgat cgctcaaaaa attgagggct attttatgga acattttgcc 600
tttccaacgc cccccctact catccattcg ggcgatgcta ttgtggaata ttgcagcaa 660
aaatacgccc ttaagaaaaa tgcacacgca ttacctaaag tggaatttca tgcgacggcg 720

gatgtgatct ggctagaaaa acaagctaaa gaatggctca aattgtaa

768

<210> 18
<211> 256
<212> PRT
<213> Helicobacter pylori

<220>
<221> misc_feature
<222> (256)..(256)
<223> Xaa can be any naturally occurring amino acid

<400> 18

Met Lys Ile Gly Val Phe Asp Ser Gly Val Gly Gly Phe Ser Val Leu
1 5 10 15

Lys Ser Leu Leu Lys Ala Gln Leu Phe Asp Glu Ile Ile Tyr Tyr Gly
20 25 30

Asp Ser Ala Arg Val Pro Tyr Gly Thr Lys Asp Pro Thr Thr Ile Lys
35 40 45

Gln Phe Gly Leu Glu Ala Leu Asp Phe Phe Lys Pro His Gln Ile Lys
50 55 60

Leu Leu Ile Val Ala Cys Asn Thr Ala Ser Ala Leu Ala Leu Glu Glu
65 70 75 80

Met Gln Lys His Ser Lys Ile Pro Ile Val Gly Val Ile Glu Pro Ser
85 90 95

Ile Leu Ala Ile Lys Gln Gln Val Lys Asp Lys Asn Ala Pro Ile Leu
100 105 110

Val Leu Gly Thr Lys Ala Thr Ile Gln Ser Asn Ala Tyr Asp Asn Ala
115 120 125

Leu Lys Arg Gln Gly Tyr Leu Asn Val Ser His Leu Ala Thr Ser Leu
130 135 140

Phe Val Pro Leu Ile Glu Glu Ser Ile Leu Glu Gly Glu Leu Leu Glu
145 150 155 160

Thr Cys Met Arg Tyr Tyr Phe Thr Pro Leu Lys Ile Leu Pro Glu Val
165 170 175

Ile Ile Leu Gly Cys Thr His Phe Pro Leu Ile Ala Gln Lys Ile Glu
180 185 190

Gly Tyr Phe Met Glu His Phe Ala Phe Pro Thr Pro Pro Leu Leu Ile
195 200 205

His Ser Gly Asp Ala Ile Val Glu Tyr Leu Gln Gln Lys Tyr Ala Leu
210 215 220

Lys Lys Asn Ala His Ala Leu Pro Lys Val Glu Phe His Ala Ser Gly
225 230 235 240

Asp Val Ile Trp Leu Glu Lys Gln Ala Lys Glu Trp Leu Lys Leu Xaa
245 250 255

<210> 19
<211> 768
<212> DNA
<213> Helicobacter pylori

<400> 19
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aaagcgcaat tatttgatga aatcatctat tatggcgata gcgctagagt gccttatggc 120
actaaagacc ccaccacgat caagcaattt ggcttagagg ctttgattt ttcaaaccg 180
caccagatta aattattgat tgtggcatgc aacacagcga gcgctctagc tttagaagag 240
atgcaaaagc attcctaaat ccctattgtg ggcggtgattg agccaagcat tttagcgatc 300
aaacaacaag taaaggataa aaacgcccc attttagtgc tagggacaaa agcgacgatt 360
caatctaacy cttacgataa cgctctgaaa caacaaggct atttgaacct ttcgatttta 420
gccacttctc tttttgtgcc tttgattgaa gaaaatattt tagagggcga attgtagaaa 480
acttgcattg gttattattt cactccctta gagattttac ctgaagtgat cattttaggt 540
tgcacgcatt ttcccttaat cgctcaaaaa attgagggct atttcatggg gcattttgcc 600
cttccaacgc ccccatcact catccattct ggcgacgcta ttgtagaata ttgcaacaa 660
aaatacgccc ttaagaaaaa tgcacacgca ttccctaaag tggaaattta tgcgagcggc 720
gatatgatct ggctagaaaa acaagctaaa gaatggctca aattgtaa 768

<210> 20
<211> 256
<212> PRT
<213> Helicobacter pylori

<220>
<221> misc_feature
<222> (256)..(256)
<223> Xaa can be any naturally occurring amino acid

<400> 20

Met Lys Ile Gly Val Phe Asp Ser Gly Val Gly Gly Phe Ser Val Leu
1 5 10 15

Lys Ser Leu Leu Lys Ala Gln Leu Phe Asp Glu Ile Ile Tyr Tyr Gly
20 25 30

Asp Ser Ala Arg Val Pro Tyr Gly Thr Lys Asp Pro Thr Thr Ile Lys
35 40 45

Gln Phe Gly Leu Glu Ala Leu Asp Phe Phe Lys Pro His Gln Ile Lys
50 55 60

Leu Leu Ile Val Ala Cys Asn Thr Ala Ser Ala Leu Ala Leu Glu Glu
65 70 75 80

Met Gln Lys His Ser Lys Ile Pro Ile Val Gly Val Ile Glu Pro Ser
85 90 95

Ile Leu Ala Ile Lys Gln Gln Val Lys Asp Lys Asn Ala Pro Ile Leu
100 105 110

Val Leu Gly Thr Lys Ala Thr Ile Gln Ser Asn Ala Tyr Asp Asn Ala
115 120 125

Leu Lys Gln Gln Gly Tyr Leu Asn Val Ser His Leu Ala Thr Ser Leu
130 135 140

Phe Val Pro Leu Ile Glu Glu Asn Ile Leu Glu Gly Glu Leu Leu Glu
145 150 155 160

Thr Cys Met Arg Tyr Tyr Phe Thr Pro Leu Glu Ile Leu Pro Glu Val
165 170 175

Ile Ile Leu Gly Cys Thr His Phe Pro Leu Ile Ala Gln Lys Ile Glu
180 185 190

Gly Tyr Phe Met Gly His Phe Ala Leu Pro Thr Pro Pro Ile Leu Ile
195 200 205

His Ser Gly Asp Ala Ile Val Glu Tyr Leu Gln Gln Lys Tyr Ala Leu
210 215 220

Lys Lys Asn Ala His Ala Phe Pro Lys Val Glu Phe His Ala Ser Gly
225 230 235 240

Asp Met Ile Trp Leu Glu Lys Gln Ala Lys Glu Trp Leu Lys Leu Xaa
245 250 255

<210> 21
<211> 768
<212> DNA
<213> Helicobacter pylori

<400> 21
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aaagcgcaat tatttgatga aatcatctat tatggcgata gcgctagagt gccttatggc 120
actaaagacc ccaccacgat caagcaattt ggcttagagg ctttggattt tttaaaccg 180
caccagatta aattattgat ttagcatgc aacacagcga gcgctctagc tttagaagag 240
atgcaaaagc attccaaaat ccttattgtg ggcgtgattg agccaagcat ttagcgatc 300
aaacaacaag taaaagataa aaacgcccct attttagtgc tagggacaaa agcgacgatt 360
caatctaacg cttatgacaa cgccctgaaa caacaaggct atttgaatgt ttgcgattta 420
gccacttctc tttttgtgcc ttgattgaa gaaagtattt tagagggcga attgttagaa 480
acttgcattc gttattattt cactccctta aagattttac ctgaagtgat tatttttaggt 540
tgcacgcatt ttcccttgat cgctcaaaaa attgagagct attttatggg gcattttgcc 600
cttccaacgc cccccctact catccattct ggcgatgcta ttgtggaata ttgcagcaa 660
aaatacgccc ttaagaaaaa cgcacacgca ttccctaagg tggaatttca tgcgagcggc 720
gatgtgatct ggctagaaaa acaagctaaa gaatggctca aattgtaa 768

<210> 22
<211> 256
<212> PRT
<213> Helicobacter pylori

<220>
<221> misc feature
<222> (256)..(256)
<223> Xaa can be any naturally occurring amino acid

<400> 22

Met Lys Ile Gly Val Phe Asp Ser Gly Val Gly Gly Phe Ser Val Leu
1 5 10 15

Lys Ser Leu Leu Lys Ala Gln Leu Phe Asp Glu Ile Ile Tyr Tyr Gly
20 25 30

Asp Ser Ala Arg Val Pro Tyr Gly Thr Lys Asp Pro Thr Thr Ile Lys
35 40 45

Gln Phe Gly Leu Glu Ala Leu Asp Phe Phe Lys Pro His Gln Ile Lys
50 55 60

Leu Leu Ile Val Ala Cys Asn Thr Ala Ser Ala Leu Ala Leu Glu Glu
65 70 75 80

Met Gln Lys His Ser Lys Ile Pro Ile Val Gly Val Ile Glu Pro Ser
85 90 95

Ile Leu Ala Ile Lys Gln Gln Val Lys Asp Lys Asn Ala Pro Ile Leu
100 105 110

Val Leu Gly Thr Lys Ala Thr Ile Gln Ser Asn Ala Tyr Asp Asn Ala
115 120 125

Leu Lys Gln Gln Gly Tyr Leu Asn Val Ser His Leu Ala Thr Ser Leu
130 135 140

Phe Val Pro Leu Ile Glu Glu Ser Ile Leu Glu Gly Glu Leu Leu Glu
145 150 155 160

Thr Cys Met Arg Tyr Tyr Phe Thr Pro Leu Lys Ile Leu Pro Glu Val
165 170 175

Ile Ile Leu Gly Cys Thr His Phe Pro Leu Ile Ala Gln Lys Ile Glu
180 185 190

Ser Tyr Phe Met Gly His Phe Ala Leu Pro Thr Pro Pro Leu Leu Ile
 195 200 205

His Ser Gly Asp Ala Ile Val Glu Tyr Leu Gln Gln Lys Tyr Ala Leu
 210 215 220

Lys Lys Asn Ala His Ala Phe Pro Lys Val Glu Phe His Ala Ser Gly
 225 230 235 240

Asp Val Ile Trp Leu Glu Lys Gln Ala Lys Glu Trp Leu Lys Leu Xaa
 245 250 255

<210> 23
 <211> 768
 <212> DNA
 <213> Helicobacter pylori

<400> 23
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 actaaagacc ccaccacgat caagcaattt ggcttagagg ctttggtatt tttcaaaccg 180
 caccagattg gattattgat tgtggcatgc aacacagcga gcgctctggc tttagaagag 240
 atgcaaaaat attccaaaat ccctattgtg ggcgtgattg agccaagcat ttagcgatc 300
 aaacaacaag taaaagataa aaacgcccc atttttagtgc tagggacaaa agcgacgatc 360
 caatctaacg cttatgataa cgccctgaaa caacaaggct atttgaacat ttgcgattta 420
 gccacttctc tttttgtgcc cttgattgaa gaaagtattt tagagggcga attgtagaa 480
 acttgcattc gttattattt cactccatta gagattttac ctgaagtgat catttttaggt 540
 tgcacgcatt ttcccttgat cgctcaaaaa attgagagct attttatgga gcattttgcc 600
 ctttcaacgc ccccttact catccattct ggcgatgcta ttgtggaata cttgaacaa 660
 aaatacgccc ttaagaaaaa cgcacacgca ttccctaaa tggaatttca tgcgacggc 720
 gatgtgatct ggctagaaaa acaggctaaa gaatggctca aattgtaa 768

<210> 24
 <211> 256
 <212> PRT
 <213> Helicobacter pylori

<220>
 <221> misc_feature

<222> (256)..(256)

<223> Xaa can be any naturally occurring amino acid

<400> 24

Met Lys Ile Gly Val Phe Asp Ser Gly Val Gly Gly Phe Ser Val Leu
1 5 10 15

Lys Ser Leu Leu Lys Ala Gln Leu Phe Asp Glu Ile Ile Tyr Tyr Gly
20 25 30

Asp Ser Ala Arg Val Pro Tyr Gly Thr Lys Asp Pro Thr Thr Ile Lys
35 40 45

Gln Phe Gly Leu Glu Ala Leu Asp Phe Phe Lys Pro His Gln Ile Gly
50 55 60

Leu Leu Ile Val Ala Cys Asn Thr Ala Ser Ala Leu Ala Leu Glu Glu
65 70 75 80

Met Gln Lys Tyr Ser Lys Ile Pro Ile Val Gly Val Ile Glu Pro Ser
85 90 95

Ile Leu Ala Ile Lys Gln Gln Val Lys Asp Lys Asn Ala Pro Ile Leu
100 105 110

Val Leu Gly Thr Lys Ala Thr Ile Gln Ser Asn Ala Tyr Asp Asn Ala
115 120 125

Leu Lys Gln Gln Gly Tyr Leu Asn Ile Ser His Leu Ala Thr Ser Leu
130 135 140

Phe Val Pro Leu Ile Glu Glu Ser Ile Leu Glu Gly Glu Leu Leu Glu
145 150 155 160

Thr Cys Met Arg Tyr Tyr Phe Thr Pro Leu Glu Ile Leu Pro Glu Val
165 170 175

Ile Ile Leu Gly Cys Thr His Phe Pro Leu Ile Ala Gln Lys Ile Glu
180 185 190

Ser Tyr Phe Met Glu His Phe Ala Leu Ser Thr Pro Pro Leu Leu Ile
195 200 205

His Ser Gly Asp Ala Ile Val Glu Tyr Leu Gln Gln Lys Tyr Ala Leu
 210 215 220

Lys Lys Asn Ala His Ala Phe Pro Lys Val Glu Phe His Ala Ser Gly
 225 230 235 240

Asp Val Ile Trp Leu Glu Lys Gln Ala Lys Glu Trp Leu Lys Leu Xaa
 245 250 255

<210> 25
 <211> 768
 <212> DNA
 <213> Helicobacter pylori

<400> 25
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 actaaagacc ccaccacgat caagcaattt ggcttagagg ctttggaattt ttccaacgc 180
 cacaaaattg aattattaat tgtggcatgc aacacagcga gcgctctggc tttagaagag 240
 atgcaaaagc attccaaaat ccccatgtgt ggcgtagattg agccaagcat tttagcgatc 300
 aaacaacaag tgaagataa aaacaccctt attttagtgc tagggacaaa agcgacgatc 360
 caatctaagc cttacgataa cgccctgaaa caacaaggct atttgaaggt ttgcgatttg 420
 gccactcttc tttttgtgcc tttgattgaa gaaagtattt tagagggcga attgttagaa 480
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 tgcacgcatt ttcccttgat cgctcaaaaa attgagggct attttatgga acattttgcc 600
 cttccaacgc cccccctact catcattctt ggcgacgcta ttgtgggata ttgcagcaa 660
 aaatacgccc ttaagaaaaa cgcacacgca tccctaaaag tggaatttca tgcgagcggc 720
 gatgtaattt ggctagaaaa acaggctaaa gaatggctca aattgtaa 768

<210> 26
 <211> 256
 <212> PRT
 <213> Helicobacter pylori

<220>
 <221> misc_feature
 <222> (256)..(256)
 <223> Xaa can be any naturally occurring amino acid

<400> 26

Met Lys Ile Gly Val Phe Asp Ser Gly Val Gly Gly Phe Ser Val Leu
1 5 10 15

Lys Ser Leu Leu Lys Ala Gln Leu Phe Asp Glu Ile Ile Tyr Tyr Gly
20 25 30

Asp Ser Ala Arg Val Pro Tyr Gly Thr Lys Asp Pro Thr Thr Ile Lys
35 40 45

Gln Phe Gly Leu Glu Ala Leu Asp Phe Phe Lys Pro His Lys Ile Glu
50 55 60

Leu Leu Ile Val Ala Cys Asn Thr Ala Ser Ala Leu Ala Leu Glu Glu
65 70 75 80

Met Gln Lys His Ser Lys Ile Pro Ile Val Gly Val Ile Glu Pro Ser
85 90 95

Ile Leu Ala Ile Lys Gln Gln Val Lys Asp Lys Asn Thr Pro Ile Leu
100 105 110

Val Leu Gly Thr Lys Ala Thr Ile Gln Ser Asn Ala Tyr Asp Asn Ala
115 120 125

Leu Lys Gln Gln Gly Tyr Leu Lys Val Ser His Leu Ala Thr Ser Leu
130 135 140

Phe Val Pro Leu Ile Glu Glu Ser Ile Leu Glu Gly Glu Leu Leu Glu
145 150 155 160

Thr Cys Met Arg Tyr Tyr Phe Thr Pro Leu Glu Ile Leu Pro Glu Val
165 170 175

Val Ile Leu Gly Cys Thr His Phe Pro Leu Ile Ala Gln Lys Ile Glu
180 185 190

Gly Tyr Phe Met Glu His Phe Ala Leu Pro Thr Pro Pro Leu Leu Ile
195 200 205

His Ser Gly Asp Ala Ile Val Gly Tyr Leu Gln Gln Lys Tyr Ala Leu
210 215 220

Lys Lys Asn Ala His Ala Phe Pro Lys Val Glu Phe His Ala Ser Gly
225 230 235 240

Asp Val Ile Trp Leu Glu Lys Gln Ala Lys Glu Trp Leu Lys Leu Xaa
245 250 255

<210> 27
<211> 768
<212> DNA
<213> Helicobacter pylori

<400> 27
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actaaagacc ccaccacgat caagcaattt ggcttagagg ctttggtatt tttaaaccg 180
cacaagattg aattattgat tgtggcatgc aacacagcga gcgctctagc tttagaagaa 240
atgcaaaagc attccaaaat ccctattgtg ggcggtgatt aaccaagcat tttagcgatc 300
aaacaacaag taaagataa aaacgcccct attttagtgc tagggacaaa agcgacgatt 360
caatctaacg cttatgacaa cgccctgaaa caacaaggct atttgaatgt ttgcgattta 420
gccacttctc tttttgtgcc ttgattgaa gaaaatattt tagaggcgca attgctagaa 480
acttgcattc gttattattt cactccatta gagatcttgc ctgaagtggg tatttttaggc 540
tgacgcgatt ttcccttgat cgctcaccaa attgagggtt attttatgga gcattttgcc 600
ctttcaacgc cccccctact catccattct ggcgatgcta ttgtggaata ttgcagcaa 660
aaatacgccc ttaagaaaaa cgcattgtgca ttccctaaag tagaatttca tgcgagcggc 720
gatgtaattt ggctagaaaa acaggctaaa gaatggctca aattgtaa 768

<210> 28
<211> 256
<212> PRT
<213> Helicobacter pylori

<220>
<221> misc_feature
<222> (256)..(256)
<223> Xaa can be any naturally occurring amino acid

<400> 28

Met Lys Ile Gly Val Phe Asp Ser Gly Val Gly Gly Phe Ser Val Leu
1 5 10 15

Lys Ser Leu Leu Lys Ala Gln Ile Phe Asp Glu Ile Ile Tyr Tyr Gly
20 25 30

Asp Ser Ala Arg Val Pro Tyr Gly Thr Lys Asp Pro Thr Thr Ile Lys
35 40 45

Gln Phe Gly Leu Glu Ala Leu Asp Phe Phe Lys Pro His Lys Ile Glu
50 55 60

Leu Leu Ile Val Ala Cys Asn Thr Ala Ser Ala Leu Ala Leu Glu Glu
65 70 75 80

Met Gln Lys His Ser Lys Ile Pro Ile Val Gly Val Ile Glu Pro Ser
85 90 95

Ile Leu Ala Ile Lys Gln Gln Val Lys Asp Lys Asn Ala Pro Ile Leu
100 105 110

Val Leu Gly Thr Lys Ala Thr Ile Gln Ser Asn Ala Tyr Asp Asn Ala
115 120 125

Leu Lys Gln Gln Gly Tyr Leu Asn Val Ser His Leu Ala Thr Ser Leu
130 135 140

Phe Val Pro Leu Ile Glu Glu Asn Ile Leu Glu Gly Glu Leu Leu Glu
145 150 155 160

Thr Cys Met Arg Tyr Tyr Phe Thr Pro Leu Glu Ile Leu Pro Glu Val
165 170 175

Val Ile Leu Gly Cys Thr His Phe Pro Leu Ile Ala His Gln Ile Glu
180 185 190

Gly Tyr Phe Met Glu His Phe Ala Leu Ser Thr Pro Pro Leu Leu Ile
195 200 205

His Ser Gly Asp Ala Ile Val Glu Tyr Leu Gln Gln Lys Tyr Ala Leu
210 215 220

Lys Lys Asn Ala Cys Ala Phe Pro Lys Val Glu Phe His Ala Ser Gly
225 230 235 240

Asp Val Ile Trp Leu Glu Lys Gln Ala Lys Glu Trp Leu Lys Leu Xaa
 245 250 255

<210> 29
 <211> 768
 <212> DNA
 <213> Helicobacter pylori

<400> 29
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 actaaagacc ccaccacgat caagcaattt ggcttagagg ctttgattt tttcaaaccg 180
 cacaagattg aattattgat tgtggcatgc aacacagcga gcgctctagc tttaggagag 240
 atgcaaaagt attccaaaaa ccctattgtg gcggtgattg agccaagcat ttagcgatc 300
 aaacaacaag taaaagataa aaacgcccct attttagtag tagggacaaa agcgacgatt 360
 cgatccaacg cttatgacaa cgccctgaaa caacaaggct atttgaatat ttgcgattta 420
 gccacttctc tttttgtgcc tttgattgaa gaaaatattt tagaggcgca attgctagaa 480
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 tgcacgcatt ttcccttgat cgctcaccaa attgagggtc attttatgga gcattttgcc 600
 ctttcaacgc cccccctact catccattct gccgatgcta ttgtggaata ttgcaacaa 660
 aaatacgccc ttaagaaaaa cgcattgcga ttccctaaag tagaattcca tgcgagcggc 720
 gatgtaattt ggctagaaaa acaggctaaa gaatggctca aattgtaa 768

<210> 30
 <211> 256
 <212> PRT
 <213> Helicobacter pylori

<220>
 <221> misc_feature
 <222> (256)..(256)
 <223> Xaa can be any naturally occurring amino acid

<400> 30

Met Lys Ile Gly Val Phe Asp Ser Gly Val Gly Gly Phe Ser Val Leu
 1 5 10 15

Lys Ser Leu Leu Lys Val Gln Leu Phe Asp Glu Ile Ile Tyr Tyr Gly
 20 25 30

Asp Ser Ala Arg Val Pro Tyr Gly Thr Lys Asp Pro Thr Thr Ile Lys
35 40 45

Gln Phe Gly Leu Glu Ala Leu Asp Phe Phe Lys Pro His Lys Ile Glu
50 55 60

Leu Leu Ile Val Ala Cys Asn Thr Ala Ser Ala Leu Ala Leu Gly Glu
65 70 75 80

Met Gln Lys Tyr Ser Lys Ile Pro Ile Val Gly Val Ile Glu Pro Ser
85 90 95

Ile Leu Ala Ile Lys Gln Gln Val Lys Asp Lys Asn Ala Pro Ile Leu
100 105 110

Val Leu Gly Thr Lys Ala Thr Ile Arg Ser Asn Ala Tyr Asp Asn Ala
115 120 125

Leu Lys Gln Gln Gly Tyr Leu Asn Ile Ser His Leu Ala Thr Ser Leu
130 135 140

Phe Val Pro Leu Ile Glu Glu Asn Ile Leu Glu Gly Glu Leu Leu Glu
145 150 155 160

Thr Cys Met Arg Tyr Tyr Phe Thr Pro Leu Glu Ile Leu Pro Glu Val
165 170 175

Val Ile Leu Gly Cys Thr His Phe Pro Leu Ile Ala His Gln Ile Glu
180 185 190

Gly Tyr Phe Met Glu His Phe Ala Leu Ser Thr Pro Pro Leu Leu Ile
195 200 205

His Ser Gly Asp Ala Ile Val Glu Tyr Leu Gln Gln Lys Tyr Ala Leu
210 215 220

Lys Lys Asn Ala Cys Ala Phe Pro Lys Val Glu Phe His Ala Ser Gly
225 230 235 240

Asp Val Ile Trp Leu Glu Lys Gln Ala Lys Glu Trp Leu Lys Leu Xaa
245 250 255

<210> 31
 <211> 768
 <212> DNA
 <213> *Helicobacter pylori*

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<400> 31
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actaaagacc ccaccacgat caagcaattt ggcttagagg ctttggattt ttccaacog      180
caccagattg gattattgat tgtggcatgc aacacagcga gcgctctagc tttagaagag      240
atgcaaaaac attccaaaat ccctattgtg ggtgtgattg agccaagcat tttagcgatc      300
aaacaacaag taaagataa aaacgcccct attttagtgt tagggacaaa agcgacgatt      360
caatccaacg cttatgacaa cgccctgaaa caacaaggct atttgaacgt ttgcatttta      420
gccactcttc tttttgtgcc ttgtattgaa gaaaatattt tagagggcga attgtagaaa      480
acttgcattg gttattattt cactccatta gagattttac ctgaagtggg tatttttaggt      540
tgcacgcatt ttcccttgat cgctcaccaa attgagggct attttatgga gcattttgcc      600
ctttcaacgc cccccttact catcatttct ggcatgctta ttgtggaata ttgcaacaa      660
aaatacacc c taaagaaaa tgcatgcgcg ttccctaaag tggaaattta tgcgagcggc      720
gatgtggttt ggctagaaaa acaggctaaa gaatggctca aattgtaa      768
  
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<210> 32
 <211> 256
 <212> PRT
 <213> *Helicobacter pylori*

<220>
 <221> misc_feature
 <222> (256)..(256)
 <223> Xaa can be any naturally occurring amino acid

<400> 32

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Met Lys Ile Gly Val Phe Asp Ser Gly Val Gly Gly Phe Ser Val Leu
1           5           10           15
  
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Lys Ser Leu Leu Lys Ala Gln Ile Phe Asp Glu Ile Ile Tyr Tyr Gly
          20           25           30
  
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Asp Ser Ala Arg Val Pro Tyr Gly Thr Lys Asp Pro Thr Thr Ile Lys
          35           40           45
  
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Gln Phe Gly Leu Glu Ala Leu Asp Phe Phe Lys Pro His Gln Ile Gly
50 55 60

Leu Leu Ile Val Ala Cys Asn Thr Ala Ser Ala Leu Ala Leu Glu Glu
65 70 75 80

Met Gln Lys His Ser Lys Ile Pro Ile Val Gly Val Ile Glu Pro Ser
85 90 95

Ile Leu Ala Ile Lys Gln Gln Val Lys Asp Lys Asn Ala Pro Ile Leu
100 105 110

Val Leu Gly Thr Lys Ala Thr Ile Gln Ser Asn Ala Tyr Asp Asn Ala
115 120 125

Leu Lys Gln Gln Gly Tyr Leu Asn Val Ser His Leu Ala Thr Ser Leu
130 135 140

Phe Val Pro Leu Ile Glu Glu Asn Ile Leu Glu Gly Glu Leu Leu Glu
145 150 155 160

Thr Cys Met Arg Tyr Tyr Phe Thr Pro Leu Glu Ile Leu Pro Glu Val
165 170 175

Val Ile Leu Gly Cys Thr His Phe Pro Leu Ile Ala His Gln Ile Glu
180 185 190

Gly Tyr Phe Met Glu His Phe Ala Leu Ser Thr Pro Pro Leu Leu Ile
195 200 205

His Ser Gly Asp Ala Ile Val Glu Tyr Leu Gln Gln Lys Tyr Thr Leu
210 215 220

Lys Lys Asn Ala Cys Ala Phe Pro Lys Val Glu Phe His Ala Ser Gly
225 230 235 240

Asp Val Val Trp Leu Glu Lys Gln Ala Lys Glu Trp Leu Lys Leu Xaa
245 250 255

<210> 33
<211> 765
<212> DNA
<213> Helicobacter pylori

<400> 33
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actaaagacc ccaccacgat caagcaattt ggcttagagg ctttggtatt tttaaaccg 180
caccagatta aattattgat tgtggcatgc aacaccgcaa gcgctctggc tttagaagag 240
atgcaaaagc attccaaaat ccctgttgtg ggcgtgattg agccaagcat ttagcgatc 300
aaacggcaag tgaagataa aaacgcccct attttggtgc tagggacaaa agcgacgatt 360
caatccaacg cctatgataa cgccctgaaa caacaaggct atttgaatgt ttcgcattta 420
gccacttctc tttttgtgcc ttgattgaa gaaagtattt tagagggcga attgctagaa 480
acttgcattc gttattattt cactccatta gagattttac ctgaagtggg tatttttaggt 540
tgcacgcatt ttcccttgat cgctcaaaaa attgagggct attttatgga gcattttgcc 600
ctttcaacgc cccccctact catccattct ggcgatgcta ttgtggaata ttgcaacaa 660
aattacgcc ttaagaaaaa cgcatgcgcg ttccctaaag tggaatttca tgcgagcggc 720
gatgtggttt ggctagaaaa acaagctaaa gaatggctta aattg 765

<210> 34
<211> 255
<212> PRT
<213> *Helicobacter pylori*

<400> 34
Met Lys Ile Gly Val Phe Asp Ser Gly Val Gly Gly Phe Ser Val Leu
1 5 10 15
Lys Ser Leu Leu Lys Ala Gln Leu Phe Asp Glu Ile Ile Tyr Tyr Gly
20 25 30
Asp Ser Ala Arg Val Pro Tyr Gly Thr Lys Asp Pro Thr Thr Ile Lys
35 40 45
Gln Phe Gly Leu Glu Ala Leu Asp Phe Phe Lys Pro His Gln Ile Lys
50 55 60
Leu Leu Ile Val Ala Cys Asn Thr Ala Ser Ala Leu Ala Leu Glu Glu
65 70 75 80
Met Gln Lys His Ser Lys Ile Pro Val Val Gly Val Ile Glu Pro Ser

Ile Leu Ala Ile Lys Arg Gln Val Lys Asp Lys Asn Ala Pro Ile Leu
 100 105 110

Val Leu Gly Thr Lys Ala Thr Ile Gln Ser Asn Ala Tyr Asp Asn Ala
 115 120 125

Leu Lys Gln Gln Gly Tyr Leu Asn Val Ser His Leu Ala Thr Ser Leu
 130 135 140

Phe Val Pro Leu Ile Glu Glu Ser Ile Leu Glu Gly Glu Leu Leu Glu
 145 150 155 160

Thr Cys Met Arg Tyr Tyr Phe Thr Pro Leu Glu Ile Leu Pro Glu Val
 165 170 175

Val Ile Leu Gly Cys Thr His Phe Pro Leu Ile Ala Gln Lys Ile Glu
 180 185 190

Gly Tyr Phe Met Glu His Phe Ala Leu Ser Thr Pro Pro Leu Leu Ile
 195 200 205

His Ser Gly Asp Ala Ile Val Glu Tyr Leu Gln Gln Asn Tyr Ala Leu
 210 215 220

Lys Lys Asn Ala Cys Ala Phe Pro Lys Val Glu Phe His Ala Ser Gly
 225 230 235 240

Asp Val Val Trp Leu Glu Lys Gln Ala Lys Glu Trp Leu Lys Leu
 245 250 255

<210> 35

<211> 29

<212> DNA

<213> Artificial primer sequence

<220>

<223> Primer used to amplify the murI gene of H. pylori using genomic DNA prepared from the J99 strain

<400> 35

aaatagtcac atgaaaatag gcgtttttg

<210> 36

<211> 28
 <212> DNA
 <213> Artificial primer sequence

 <220>
 <223> Primer used to amplify the *murI* gene of *H. pylori* using genomic DNA prepared from the J99 strain

 <400> 36
 agaattctat tacaatttga gccattct 28

 <210> 37
 <211> 26
 <212> DNA
 <213> Artificial primer sequence

 <220>
 <223> Primer used to amplify the *groE* operon of *E. coli* using genomic DNA prepared from *E. coli* strain MG1655 as the template DNA for the PCR amplification reactions

 <400> 37
 gcgaattcga tcagaatttt ttttct 26

 <210> 38
 <211> 26
 <212> DNA
 <213> Artificial primer sequence

 <220>
 <223> Primer used to amplify the *groE* operon of *E. coli* using genomic DNA prepared from *E. coli* strain MG1655 as the template DNA for the PCR amplification reactions

 <400> 38
 ataagtactt gtgaattctta tactag 26

 <210> 39
 <211> 858
 <212> DNA
 <213> *Escherichia coli*

 <400> 39
 atggctacca aactgcagga cggaataaca cttgtctg cagctacacc ttctgaacca 60
 cgtcccaccg tgctggtgtt tgactccggc gtcggtgggt tgcgtgtcta tgacgagatc 120
 cggcatctct taccggaatc ccattacatt tatgctttcg ataacgtcgc ttcccgatat 180
 ggcgaaaaaa gcgaagcggtt tattgttgag cgagtgggtg caattgtcac cgcggtgcaa 240
 gaacgttatc cccttgcgct ggctgtggtc gcttgcaaca ctgccagtag cgtttcactt 300
 cctgcattac gcgaaaagtt cgacttcccg gttgttggtg tcgtgccggc gattaaacct 360

```

gctgcacgtc tgacggcaaa tggcattgtc ggattactgg caaccgcgag aacagttaaa 420
cgttcttata ctcatgagct gatcgcgctg ttcgctaagt aatgccagat agaaatgctg 480
ggctcggcag agatggttga gttggctgaa gcgaagctac atggcgaaga tgtttctctg 540
gatgcactaa aacgtatcct acgcccgtgg ttaagaatga aagagccgcc agataccggtt 600
gtattgggtt gcacccattt ccctctacta caagaagaac tgttacaagt gctgccagag 660
ggaacccggc tgggtggattc tggcgcagcg attgctcgcc gaacggcctg gttgttagaa 720
catgaagccc cggtatgcaa atctgccgat gcgaatattg ccttttgatg ggcaatgacg 780
ccaggagctg aacaattatt gcccgtttta cagcgttacg gcttcgaaac gctcgaaaaa 840
ctggcagttt taggctga 858

```

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<210> 40
<211> 286
<212> PRT
<213> Escherichia coli

```

```

<220>
<221> misc_feature
<222> (286)..(286)
<223> Xaa can be any naturally occurring amino acid

```

```

<400> 40

```

```

Met Ala Thr Lys Leu Gln Asp Gly Asn Thr Pro Cys Leu Ala Ala Thr
1      5      10      15

```

```

Pro Ser Glu Pro Arg Pro Thr Val Leu Val Phe Asp Ser Gly Val Gly
      20      25      30

```

```

Gly Leu Ser Val Tyr Asp Glu Ile Arg His Leu Leu Pro Asp Leu His
      35      40      45

```

```

Tyr Ile Tyr Ala Phe Asp Asn Val Ala Phe Pro Tyr Gly Glu Lys Ser
      50      55      60

```

```

Glu Ala Phe Ile Val Glu Arg Val Val Ala Ile Val Thr Ala Val Gln
      65      70      75      80

```

```

Glu Arg Tyr Pro Leu Ala Leu Ala Val Val Ala Cys Asn Thr Ala Ser
      85      90      95

```

Thr Val Ser Leu Pro Ala Leu Arg Glu Lys Phe Asp Phe Pro Val Val
 100 105 110

Gly Val Val Pro Ala Ile Lys Pro Ala Ala Arg Leu Thr Ala Asn Gly
 115 120 125

Ile Val Gly Leu Leu Ala Thr Arg Gly Thr Val Lys Arg Ser Tyr Thr
 130 135 140

His Glu Leu Ile Ala Arg Phe Ala Asn Glu Cys Gln Ile Glu Met Leu
 145 150 155 160

Gly Ser Ala Glu Met Val Glu Leu Ala Glu Ala Lys Leu His Gly Glu
 165 170 175

Asp Val Ser Leu Asp Ala Leu Lys Arg Ile Leu Arg Pro Trp Leu Arg
 180 185 190

Met Lys Glu Pro Pro Asp Thr Val Val Leu Gly Cys Thr His Phe Pro
 195 200 205

Leu Leu Gln Glu Glu Leu Leu Gln Val Leu Pro Glu Gly Thr Arg Leu
 210 215 220

Val Asp Ser Gly Ala Ala Ile Ala Arg Arg Thr Ala Trp Leu Leu Glu
 225 230 235 240

His Glu Ala Pro Asp Ala Lys Ser Ala Asp Ala Asn Ile Ala Phe Cys
 245 250 255

Met Ala Met Thr Pro Gly Ala Glu Gln Leu Leu Pro Val Leu Gln Arg
 260 265 270

Tyr Gly Phe Glu Thr Leu Glu Lys Leu Ala Val Leu Gly Xaa
 275 280 285

<210> 41
 <211> 29
 <212> DNA
 <213> Artificial primer sequence

<220>
 <223> Primer used to amplify the MurI gene of *E. faecalis* using genomic DNA prepared from the ATCC 29212 type strain

<400> 41
 aaatagtcac atgaaaaatag gcgtttttg 29

<210> 42
 <211> 28
 <212> DNA
 <213> Artificial primer sequence

<220>
 <223> Primer used to amplify the MuiI gene of *E. faecalis* using genomic DNA prepared from the ATCC 29212 type strain

<400> 42
 agaattctat tacaatttga gccattct 28

<210> 43
 <211> 822
 <212> DNA
 <213> *Enterococcus faecalis*

<400> 43
 atgagcaatc aagaagccat tggattaatt gattctggcg ttggtggatt aactgtttta 60
 aaggaagcgc taaagcaatt accaaatgaa cgattaattt atttaggaga tacagcccgt 120
 tgcccatatg gtccacgacc agccgaacaa gtcgttcagt ttacttggga aatggccgat 180
 tttttattga aaaaacgaat aaaaatgcta gtaatcgcat gtaataccgc gacggctgtc 240
 gcattagaag aaattaaagc tgccttgcca attccagttg ttggtgttat ttacctggc 300
 gcacgagcag ccgttaaagt cacaataaat acaaaattg gtgtcatagg taccttaggg 360
 acaatcaaaa gtgcttccta tgaaatcgcc attaaaagta aggcaccagc aattgaggtg 420
 actagttag cttgccctaa atttgtcccc attgttgaaa gtaatacaata tcgttcttcc 480
 gtagcaaaaa aaattgtggc agaaacactt caagcactac aattaaaagg acttgatacg 540
 ttgattttag gttgtaccca ttaccggttg ttacgtccgg tgattcaaaa tgtgatgggg 600
 agtcatgtga cattaattga ctccaggagcc gaaacagttg gcgaagtcat catgcttctc 660
 gattattttg acattgccca cagcctgaa gcgcctacac agccccatga attttataca 720
 actggttctg caaaaatggt tgaagagatt gcaagcagtt ggcttgggat agagaactta 780
 aaagcacaac agattcactt aggaggaaac gaaaatgatt ag 822

<210> 44
 <211> 274
 <212> PRT
 <213> *Enterococcus faecalis*

<220>
<221> misc_feature
<222> (274)..(274)
<223> Xaa can be any naturally occurring amino acid

<400> 44

Met Ser Asn Gln Glu Ala Ile Gly Leu Ile Asp Ser Gly Val Gly Gly
1 5 10 15

Leu Thr Val Leu Lys Glu Ala Leu Lys Gln Leu Pro Asn Glu Arg Leu
20 25 30

Ile Tyr Leu Gly Asp Thr Ala Arg Cys Pro Tyr Gly Pro Arg Pro Ala
35 40 45

Glu Gln Val Val Gln Phe Thr Trp Glu Met Ala Asp Phe Leu Leu Lys
50 55 60

Lys Arg Ile Lys Met Leu Val Ile Ala Cys Asn Thr Ala Thr Ala Val
65 70 75 80

Ala Leu Glu Glu Ile Lys Ala Ala Leu Pro Ile Pro Val Val Gly Val
85 90 95

Ile Leu Pro Gly Ala Arg Ala Ala Val Lys Val Thr Lys Asn Asn Lys
100 105 110

Ile Gly Val Ile Gly Thr Leu Gly Thr Ile Lys Ser Ala Ser Tyr Glu
115 120 125

Ile Ala Ile Lys Ser Lys Ala Pro Ala Ile Glu Val Thr Ser Leu Ala
130 135 140

Cys Pro Lys Phe Val Pro Ile Val Glu Ser Asn Gln Tyr Arg Ser Ser
145 150 155 160

Val Ala Lys Lys Ile Val Ala Glu Thr Leu Gln Ala Leu Gln Leu Lys
165 170 175

Gly Leu Asp Thr Leu Ile Leu Gly Cys Thr His Tyr Pro Leu Leu Arg
180 185 190

Pro Val Ile Gln Asn Val Met Gly Ser His Val Thr Leu Ile Asp Ser

195

200

205

Gly Ala Glu Thr Val Gly Glu Val Ser Met Leu Leu Asp Tyr Phe Asp
 210 215 220

Ile Ala His Thr Pro Glu Ala Pro Thr Gln Pro His Glu Phe Tyr Thr
 225 230 235 240

Thr Gly Ser Ala Lys Met Phe Glu Glu Ile Ala Ser Ser Trp Leu Gly
 245 250 255

Ile Glu Asn Leu Lys Ala Gln Gln Ile His Leu Gly Gly Asn Glu Asn
 260 265 270

Asp Xaa

<210> 45
 <211> 801
 <212> DNA
 <213> Staphylococcus aureus

<400> 45
 atgaataaac caataggtgt aatagactct ggtgtcggag gtttgacagt agctaagaa 60
 attatgcgtc agttgccaaa tgagacgatt tattacttag gtgatattgg gcgatgtcca 120
 tatgggccaa gaccaggaga acaagtaaaa caatatacag ttgaaatcgc tcgtaaatta 180
 atggaatttg atataaaaa gctcgtgatt gcttgtaata ctgcaactgc tgtagcttta 240
 gaatatattac aaaagacctt atcaatctca gtgattggcg taattgaacc aggtgctaga 300
 acagcaataa tgacgactag aaatcaaaat gtattagtac taggaacgga aggcacaatt 360
 aaatctgaag catatcgaac acatattaaa cgtataaatc cacatgtaga ggtacatggc 420
 gttgcctgtc caggttttgt gccacttgta gaacaaatga gatatatgta tccaacaatt 480
 acaagcattg ttattcatca aacactgaaa cgttggcgta atagtgaagc tgatactgtc 540
 atttttaggt gtaccacta tccattgctc tataaaccta tctatgatta ttttggtggt 600
 aaaaagacag tgatttcgtc tggattagaa acggctcgtg aagttagtgc attgctaaca 660
 tttagtaatg aacatgcaag ttatactgaa catccagatc atcgattttt tgcaacaggc 720
 gataccacac atattactaa cattatcaaa gaatggctaa atttatctgt caatgtggaa 780
 cgtatatcag tgaatgacta g 801

<210> 46
<211> 267
<212> PRT
<213> Staphylococcus aureus

<220>
<221> misc_feature
<222> (267)..(267)
<223> Xaa can be any naturally occurring amino acid

<400> 46

Met Asn Lys Pro Ile Gly Val Ile Asp Ser Gly Val Gly Gly Leu Thr
1 5 10 15

Val Ala Lys Glu Ile Met Arg Gln Leu Pro Asn Glu Thr Ile Tyr Tyr
20 25 30

Leu Gly Asp Ile Gly Arg Cys Pro Tyr Gly Pro Arg Pro Gly Glu Gln
35 40 45

Val Lys Gln Tyr Thr Val Glu Ile Ala Arg Lys Leu Met Glu Phe Asp
50 55 60

Ile Lys Met Leu Val Ile Ala Cys Asn Thr Ala Thr Ala Val Ala Leu
65 70 75 80

Glu Tyr Leu Gln Lys Thr Leu Ser Ile Ser Val Ile Gly Val Ile Glu
85 90 95

Pro Gly Ala Arg Thr Ala Ile Met Thr Thr Arg Asn Gln Asn Val Leu
100 105 110

Val Leu Gly Thr Glu Gly Thr Ile Lys Ser Glu Ala Tyr Arg Thr His
115 120 125

Ile Lys Arg Ile Asn Pro His Val Glu Val His Gly Val Ala Cys Pro
130 135 140

Gly Phe Val Pro Leu Val Glu Gln Met Arg Tyr Ser Asp Pro Thr Ile
145 150 155 160

Thr Ser Ile Val Ile His Gln Thr Leu Lys Arg Trp Arg Asn Ser Glu
165 170 175

Ser Asp Thr Val Ile Leu Gly Cys Thr His Tyr Pro Leu Leu Tyr Lys
180 185 190

Pro Ile Tyr Asp Tyr Phe Gly Gly Lys Lys Thr Val Ile Ser Ser Gly
195 200 205

Leu Glu Thr Ala Arg Glu Val Ser Ala Leu Leu Thr Phe Ser Asn Glu
210 215 220

His Ala Ser Tyr Thr Glu His Pro Asp His Arg Phe Phe Ala Thr Gly
225 230 235 240

Asp Thr Thr His Ile Thr Asn Ile Ile Lys Glu Trp Leu Asn Leu Ser
245 250 255

Val Asn Val Glu Arg Ile Ser Val Asn Asp Xaa
260 265

<210> 47
<211> 822
<212> DNA
<213> Enterococcus faecium

<400> 47
atgatacgat tgacagataa tcgccctatc ggattttattg attcaggtgt cgcgcgcttg 60
actgtagtaa aagaagccct gaaacaatta ccgaatgaaa atattttatt ttagggagac 120
acagcacgct gcccatatgg ccttagaccc gcggaacagg taatccagta tacttgggaa 180
atgacggatt atctggtgga gcaaggaatc aagatgctgg tgatcgctg caataccgca 240
actcggtgg ctttagaaga aatcaaagct gctctttcta ttccagtcac cgggtgtgac 300
cttcccggta ctagagcggc agtaaaaaaa acacaaaata aacaagttgg cattatcggg 360
acgattggta cggtaaaaag tcaagcttat gaaaaagcac tgaagagaa agtaccagaa 420
ttgactgtga caagtcttgc ttgtccaaaa tttgtttcag ttgtcgaaa taatgaatac 480
cattcatcgg tggcgaaaaa aattgtggca gaaacattag ctcccttaac cactaaaaaa 540
atcgatacat tgattttggg atgcacccat tatccattat tacgccccat cattcaaaat 600
gtaatgggag aaaatgttca actgatcgat tctggagcag aaacagtagg tgaagtatct 660
atgctgttag attatttcaa tctgagcaat tcaccgcaaa atggctggac attatgccag 720
ttttatacaa ctggctctgc caaacttttc gaggaaatag ctgaagactg gcttggaaac 780

ggacacttaa atgtagaaca tatcgaattg ggaggaaaat aa

822

<210> 48
<211> 274
<212> PRT
<213> Enterococcus faecium

<220>
<221> misc_feature
<222> (274)..(274)
<223> Xaa can be any naturally occurring amino acid

<400> 48

Met Ile Arg Leu Thr Asp Asn Arg Pro Ile Gly Phe Ile Asp Ser Gly
1 5 10 15

Val Gly Gly Leu Thr Val Val Lys Glu Ala Leu Lys Gln Leu Pro Asn
20 25 30

Glu Asn Ile Leu Phe Val Gly Asp Thr Ala Arg Cys Pro Tyr Gly Pro
35 40 45

Arg Pro Ala Glu Gln Val Ile Gln Tyr Thr Trp Glu Met Thr Asp Tyr
50 55 60

Leu Val Glu Gln Gly Ile Lys Met Leu Val Ile Ala Cys Asn Thr Ala
65 70 75 80

Thr Ala Val Ala Leu Glu Glu Ile Lys Ala Ala Leu Ser Ile Pro Val
85 90 95

Ile Gly Val Ile Leu Pro Gly Thr Arg Ala Ala Val Lys Lys Thr Gln
100 105 110

Asn Lys Gln Val Gly Ile Ile Gly Thr Ile Gly Thr Val Lys Ser Gln
115 120 125

Ala Tyr Glu Lys Ala Leu Lys Glu Lys Val Pro Glu Leu Thr Val Thr
130 135 140

Ser Leu Ala Cys Pro Lys Phe Val Ser Val Val Glu Ser Asn Glu Tyr
145 150 155 160

His Ser Ser Val Ala Lys Lys Ile Val Ala Glu Thr Leu Ala Pro Leu

165

170

175

Thr Thr Lys Lys Ile Asp Thr Leu Ile Leu Gly Cys Thr His Tyr Pro
180 185 190

Leu Leu Arg Pro Ile Ile Gln Asn Val Met Gly Glu Asn Val Gln Leu
195 200 205

Ile Asp Ser Gly Ala Glu Thr Val Gly Glu Val Ser Met Leu Leu Asp
210 215 220

Tyr Phe Asn Leu Ser Asn Ser Pro Gln Asn Gly Arg Thr Leu Cys Gln
225 230 235 240

Phe Tyr Thr Thr Gly Ser Ala Lys Leu Phe Glu Glu Ile Ala Glu Asp
245 250 255

Trp Leu Gly Ile Gly His Leu Asn Val Glu His Ile Glu Leu Gly Gly
260 265 270

Lys Xaa

<210> 49
<211> 335
<212> DNA
<213> Enterococcus saccharolyticus

<400> 49
gcatgtaata ccgcaacggc ggtagcgta gaagaaatta aagcgcaatt agatattcca 60
gtcgtcggtg tgatcttacc tggtagctgt gctgcagta aagctacgaa aaatcgtaaa 120
atcggtatta taggaacagc ggtacaatt aaaagtagtt cgtatgagca agcaattaaa 180
atgaagtgct ctgaagcatc ggtgactagt ttagcttgct ctaaaattgt accgattggt 240
gaaagtaatc aatttcaatc atcggtagct aaaaaaattg ttgctgagac gttattacca 300
ttgcaacata aaaaattaga tacgttgatt ttagg 335

<210> 50
<211> 111
<212> PRT
<213> Enterococcus saccharolyticus

<400> 50

Ala Cys Asn Thr Ala Thr Ala Val Ala Leu Glu Glu Ile Lys Ala Gln
1 5 10 15

Leu Asp Ile Pro Val Val Gly Val Ile Leu Pro Gly Thr Arg Ala Ala
20 25 30

Val Lys Ala Thr Lys Asn Arg Gln Ile Gly Ile Ile Gly Thr Ala Gly
35 40 45

Thr Ile Lys Ser Ser Ser Tyr Glu Gln Ala Ile Lys Met Lys Val Pro
50 55 60

Glu Ala Ser Val Thr Ser Leu Ala Cys Pro Lys Phe Val Pro Ile Val
65 70 75 80

Glu Ser Asn Gln Phe Gln Ser Ser Val Ala Lys Lys Ile Val Ala Glu
85 90 95

Thr Leu Leu Pro Leu Gln His Lys Lys Leu Asp Thr Leu Ile Leu
100 105 110

<210> 51
<211> 344
<212> DNA
<213> Enterococcus mundtii

<400> 51
gtaatcgcat gtaataccgc aactgcggtc gcattagaag aaatcaaagc aacactctcg 60
attccagtg tcggtgtgat ttgccagga acgagagcgg cagtcaagca gacgaaaaat 120
catcgagtag ggggtgattgg aacaattggt accgtcaaaa gtgctgctta cgagacggca 180
ttattggata aagcaccgga actgaaagtt accagcttgg cgtgtccaaa gtttgtttca 240
gtcgtagaaa gtaaagaata ccgatcatca gtcgctaaaa aaatcgtggc tcaaactttg 300
cttcattag aattaaaagg gatcgatacg ttgattttag gttg 344

<210> 52
<211> 114
<212> PRT
<213> Enterococcus mundtii

<400> 52

Val Ile Ala Cys Asn Thr Ala Thr Ala Val Ala Leu Glu Glu Ile Lys
1 5 10 15

Ala Thr Leu Ser Ile Pro Val Ile Gly Val Ile Leu Pro Gly Thr Arg
20 25 30

Ala Ala Val Lys Gln Thr Lys Asn His Arg Val Gly Val Ile Gly Thr
35 40 45

Ile Gly Thr Val Lys Ser Ala Tyr Glu Thr Ala Leu Leu Asp Lys
50 55 60

Ala Pro Glu Leu Lys Val Thr Ser Leu Ala Cys Pro Lys Phe Val Ser
65 70 75 80

Val Val Glu Ser Lys Glu Tyr Arg Ser Ser Val Ala Lys Lys Ile Val
85 90 95

Ala Gln Thr Leu Leu Pro Leu Glu Leu Lys Gly Ile Asp Thr Leu Ile
100 105 110

Leu Gly

<210> 53
<211> 340
<212> DNA
<213> Enterococcus casseliflavus

<400> 53
atcgcatgta ataccgcgac agcggtcgcc cttgaagaaa tcaaagaaca actaacgatac 60
ccagtgatcg gcgtgacatc gcctggcagt cgagcagcag tcaagcaag caaaaaccaa 120
cgaatcggtg tcatcgggac aaacggaacg atcaaaagtg actcttaca gcgcgcgctt 180
catggcaaaag cgccccatgc gtcctgcgtc agtttggtt gccgaagtt tgtgcccgtc 240
gtagaaagca aacaatacca tagctcggtc gccaaagaaa tcgtggcaga aacgttgcgt 300
ccattgaaaa acaaacggct agatacgttg attttagggtg 340

<210> 54
<211> 113
<212> PRT
<213> Enterococcus casseliflavus

<400> 54
Ile Ala Cys Asn Thr Ala Thr Ala Val Ala Leu Glu Glu Ile Lys Glu
1 5 10 15

Gln Leu Thr Ile Pro Val Ile Gly Val Ile Leu Pro Gly Ser Arg Ala
20 25 30

Ala Val Lys Ala Ser Lys Asn Gln Arg Ile Gly Val Ile Gly Thr Asn
35 40 45

Gly Thr Ile Lys Ser Asp Ser Tyr Lys Arg Ala Leu His Gly Lys Ala
50 55 60

Pro His Ala Ser Val Val Ser Leu Ala Cys Pro Lys Phe Val Pro Ile
65 70 75 80

Val Glu Ser Lys Gln Tyr His Ser Ser Val Ala Lys Lys Ile Val Ala
85 90 95

Glu Thr Leu Arg Pro Leu Lys Asn Lys Arg Leu Asp Thr Leu Ile Leu
100 105 110

Gly

<210> 55
<211> 337
<212> DNA
<213> Enterococcus flavescens

<400> 55
atcgcatgta ataccgcgac agcggtcgcc cttgaagaaa tcaaagaaca actaacgata 60
ccagtgtatcg gcgtgatcct gcctggcagt cgagcagcag tcaagcaag caaaaaccaa 120
cgaatcgggtg tcatcgggac aaacggaacg atcaaaagtg actcttacaa gcgcgcgctt 180
catggcaaaag cgccccatgc gtcgcgtcgt agtttggctt gcccgaaagt tgtgccgata 240
gtagaaagca aacaatacca tagctcggtc gccaaagaaa tcgtggcaga aacgttgcgt 300
ccattgaaaa acaaacggct agatacgttg attttag 337

<210> 56
<211> 112
<212> PRT
<213> Enterococcus flavescens

<400> 56

Ile Ala Cys Asn Thr Ala Thr Ala Val Ala Leu Glu Glu Ile Lys Glu

1 5 10 15
 Gln Leu Thr Ile Pro Val Ile Gly Val Ile Leu Pro Gly Ser Arg Ala
 20 25 30
 Ala Val Lys Ala Ser Lys Asn Gln Arg Ile Gly Val Ile Gly Thr Asn
 35 40 45
 Gly Thr Ile Lys Ser Asp Ser Tyr Lys Arg Ala Leu His Gly Lys Ala
 50 55 60
 Pro His Ala Ser Val Val Ser Leu Ala Cys Pro Lys Phe Val Pro Ile
 65 70 75 80
 Val Glu Ser Lys Gln Tyr His Ser Ser Val Ala Lys Lys Ile Val Ala
 85 90 95
 Glu Thr Leu Arg Pro Leu Lys Asn Lys Arg Leu Asp Thr Leu Ile Leu
 100 105 110

<210> 57
 <211> 341
 <212> DNA
 <213> Enterococcus cecorum

<400> 57
 atcgcatgta ataccgcgac tgcagcagct ttaaccctaaa ttaaggaaca attagacatt 60
 ccagttgtcg gtgtgatttt acctggaact agagctgctg tcaaaaatac aaaatcgcaa 120
 cgaattggga ttatcgccac acaaggaacc atccaaagtg gcagttatga acaagccatt 180
 ctttctaaag taccgactgc tcaacctgtg agtttagcgt gtcctagatt tgttccgata 240
 gtgaaagta atcaagcaaa ttcaagtgtg gcaaaaaaaa ttgtcgctca aacactacaa 300
 ccatgacga aaaaaaacat cgatacgttg atttttaggtt g 341

<210> 58
 <211> 113
 <212> PRT
 <213> Enterococcus cecorum

<400> 58
 Ile Ala Cys Asn Thr Ala Thr Ala Ala Leu Thr Gln Ile Lys Glu
 1 5 10 15

Gln Leu Asp Ile Pro Val Val Gly Val Ile Leu Pro Gly Thr Arg Ala
 20 25 30

Ala Val Lys Asn Thr Lys Ser Gln Arg Ile Gly Ile Ile Gly Thr Gln
 35 40 45

Gly Thr Ile Gln Ser Gly Ser Tyr Glu Gln Ala Ile Leu Ser Lys Val
 50 55 60

Pro Thr Ala Gln Pro Val Ser Leu Ala Cys Pro Arg Phe Val Pro Ile
 65 70 75 80

Val Glu Ser Asn Gln Ala Asn Ser Ser Val Ala Lys Lys Ile Val Ala
 85 90 95

Gln Thr Leu Gln Pro Met Thr Lys Lys Asn Ile Asp Thr Leu Ile Leu
 100 105 110

Gly

<210> 59
 <211> 339
 <212> DNA
 <213> Enterococcus raffinosus

<400> 59
 atcgcatgta ataccgcgac ggcagtagct ttggaagaaa ttaaaagaac cgtagatatt 60
 cccgtaatcg gtgttatata gccaggatct cgcgcagcgt taaaggcaag cgaaaatggg 120
 cgcggtgggaa ttatcggaac cattggaaca gtaaaaagtg gttcttataa acacgaacta 180
 caggaaaaag ctccgtgatac ttatgtttct agtttagcat gcccaaaatt tgtaccgatt 240
 gttgaaagta atcaatttaa tagctcggtg gcgaaaaaaa ttgtttctca aacattaact 300
 cctttgaaaa aggaaaagtt ggatacgttg attttaggt 339

<210> 60
 <211> 113
 <212> PRT
 <213> Enterococcus raffinosus

<400> 60

Ile Ala Cys Asn Thr Ala Thr Ala Val Ala Leu Glu Glu Ile Lys Arg
 1 5 10 15

Thr Val Asp Ile Pro Val Ile Gly Val Ile Gln Pro Gly Ser Arg Ala
20 25 30

Ala Leu Lys Ala Ser Glu Asn Gly Arg Val Gly Ile Ile Gly Thr Ile
35 40 45

Gly Thr Val Lys Ser Gly Ser Tyr Lys His Glu Leu Gln Glu Lys Ala
50 55 60

Pro Asp Thr Tyr Val Ser Ser Leu Ala Cys Pro Lys Phe Val Pro Ile
65 70 75 80

Val Glu Ser Asn Gln Phe Asn Ser Ser Val Ala Lys Lys Ile Val Ser
85 90 95

Gln Thr Leu Thr Pro Leu Lys Lys Glu Lys Leu Asp Thr Leu Ile Leu
100 105 110

Gly

<210> 61
<211> 341
<212> DNA
<213> Enterococcus malodoratus

<400> 61
atcgcatgta ataccgcaac cgcagtggtt ttagaagaga ttaagaagaa cgttgatatt 60
cctgttattg gtgttatcca accaggatca cgtgctgcat taaaagcaag taaaatagt 120
cgtgtaggta tcatcggaac actaggaact gttaaaagtg gatcttataa acatgagctg 180
caagaaaaag caccagaaac gtatgttgct agtctggcct gccaaaaatt tgtgccaatc 240
gttgaaagta atcagtttaa tagttctgta gccaaaaaga ttgtttcaca atctctggca 300
cccttaaaaa aggaaaaatt agatacgttg attttaggtt g 341

<210> 62
<211> 113
<212> PRT
<213> Enterococcus malodoratus

<400> 62
Ile Ala Cys Asn Thr Ala Thr Ala Val Ala Leu Glu Glu Ile Lys Lys
1 5 10 15

Asn Val Asp Ile Pro Val Ile Gly Val Ile Gln Pro Gly Ser Arg Ala
20 25 30

Ala Leu Lys Ala Ser Lys Asn Ser Arg Val Gly Ile Ile Gly Thr Leu
35 40 45

Gly Thr Val Lys Ser Gly Ser Tyr Lys His Glu Leu Gln Glu Lys Ala
50 55 60

Pro Glu Thr Tyr Val Ala Ser Leu Ala Cys Pro Lys Phe Val Pro Ile
65 70 75 80

Val Glu Ser Asn Gln Phe Asn Ser Ser Val Ala Lys Lys Ile Val Ser
85 90 95

Gln Ser Leu Ala Pro Leu Lys Lys Glu Lys Leu Asp Thr Leu Ile Leu
100 105 110

Gly

<210> 63
<211> 338
<212> DNA
<213> Enterococcus solitarius

<400> 63
gcatgtaata ccgcaacagc tgtggcttta gatgagatta aagagcaact gcaaatccct 60
gttgtgggag ttattatgcc gggaaccaga gcagctgtta aagcgactaa aaatcatcgt 120
attggtgtga ttggcacaaa aggaacagtt aaaagtcct cttacaaacg agcaatcaaa 180
gaaaaaaatg aaaatacaaa agtaacaagt ttggcttgtc cgaagtttgt tccattgtg 240
gaaagtaatc aaattcatc ttcagtggca aaaaaaattg tatttgaaac actattacc 300
ttaaaaaata aacatttaga tacgttgatt ttaggttg 338

<210> 64
<211> 112
<212> PRT
<213> Enterococcus solitarius

<400> 64

Ala Cys Asn Thr Ala Thr Ala Val Ala Leu Asp Glu Ile Lys Glu Gln

1 5 10 15
 Leu Gln Ile Pro Val Val Gly Val Ile Met Pro Gly Thr Arg Ala Ala
 20 25 30
 Val Lys Ala Thr Lys Asn His Arg Ile Gly Val Ile Gly Thr Lys Gly
 35 40 45
 Thr Val Lys Ser Ala Ser Tyr Lys Arg Ala Ile Lys Glu Lys Asn Glu
 50 55 60
 Asn Thr Lys Val Thr Ser Leu Ala Cys Pro Lys Phe Val Pro Ile Val
 65 70 75 80
 Glu Ser Asn Gln Ile His Ser Ser Val Ala Lys Lys Ile Val Phe Glu
 85 90 95
 Thr Leu Leu Pro Leu Lys Asn Lys His Leu Asp Thr Leu Ile Leu Gly
 100 105 110

<210> 65
 <211> 341
 <212> DNA
 <213> Enterococcus hirae

<400> 65
 atcgcatgta ataccgctac tgcggttgct ttagaagaaa tcaaggcggc acttcctatt 60
 ccagtcattg gtgtgatctt acctgggaca agagcagctg ttaacaaac aagaaataaa 120
 caagtaggga ttatcggaac cctcggaacg atcaaaagtc gtgcttatga aacagcgctg 180
 aaaacgaagg tacctgaact tgcggtgact agtttggtt gtccaaaatt cgtttcggtg 240
 gtggaaagta atgaatatca ttcgtcagtg gcaaaaaaaaa tcgttgccca gacactagcg 300
 ccattgggta ctaagaaaaa cgatacgttg attttaggtt g 341

<210> 66
 <211> 113
 <212> PRT
 <213> Enterococcus hirae

<400> 66
 Ile Ala Cys Asn Thr Ala Thr Ala Val Ala Leu Glu Glu Ile Lys Ala
 1 5 10 15

Ala Leu Pro Ile Pro Val Ile Gly Val Ile Leu Pro Gly Thr Arg Ala
20 25 30

Ala Val Lys Gln Thr Arg Asn Lys Gln Val Gly Ile Ile Gly Thr Leu
35 40 45

Gly Thr Ile Lys Ser Arg Ala Tyr Glu Thr Ala Leu Lys Thr Lys Val
50 55 60

Pro Glu Leu Ala Val Thr Ser Leu Ala Cys Pro Lys Phe Val Ser Val
65 70 75 80

Val Glu Ser Asn Glu Tyr His Ser Ser Val Ala Lys Lys Ile Val Ala
85 90 95

Gln Thr Leu Ala Pro Leu Val Thr Lys Lys Ile Asp Thr Leu Ile Leu
100 105 110

Gly

<210> 67
<211> 29
<212> DNA
<213> Artificial primer sequence

<220>
<223> Primer used to amplify the MurI gene of *E. faecalis* using genomic
DNA prepared from the ATCC 29212 type strain of *E. faecalis* as
the template DNA

<400> 67
aaatagtcac atgaaaatag gcgtttttg 29

<210> 68
<211> 28
<212> DNA
<213> Artificial primer sequence

<220>
<223> Primer used to amplify the MurI gene of *E. faecalis* using genomic
DNA prepared from the ATCC 29212 type strain of *E. faecalis* as
the template DNA

<400> 68
agaattctat tacaatttga gccattct 28

<210> 69

<211> 26
 <212> DNA
 <213> Artificial primer sequence

 <220>
 <223> Primer used to amplify the groE operon of E. coli using genomic DNA prepared from E. coli strain MG1655.

 <400> 69
 gcgaattcga tcagaatttt ttttct 26

 <210> 70
 <211> 26
 <212> DNA
 <213> Artificial primer sequence

 <220>
 <223> Primer used to amplify the groE operon of E. coli using genomic DNA prepared from E. coli strain MG1655.

 <400> 70
 ataagtactt gtgaatctta tactag 26

 <210> 71
 <211> 29
 <212> DNA
 <213> Artificial primer sequence

 <220>
 <223> Primer used to amplify the E. faecalis murI gene

 <400> 71
 aaaatgctag taatcgcatg taataccgc 29

 <210> 72
 <211> 26
 <212> DNA
 <213> Artificial primer sequence

 <220>
 <223> Primer used to amplify the E. faecalis murI gene

 <400> 72
 tgggtacaac ctaaaatcaa cgtatc 26

 <210> 73
 <211> 765
 <212> DNA
 <213> Aquifex pyrophilus

 <400> 73
 atgaagatag gtatctttga cagtgggtgtg gggggactta ctgttctaaa ggctataaga 60

aatagataca gaaaggttga tatagtatac ctcggtgata cgcgaagggg tccctacggc 120
 ataaggtcta aagatacgaat aatcagatac tcccttgagt gtgcggcgctt tttaaaggat 180
 aaggggtgtt atataatcgt cgttgccctgc aataccgcaa gtgcttacgc tcttgaacgt 240
 ttaagaaag agataaacgt tcccgttttc gccgttattg aacccggggg taaagaagcc 300
 ttaaaaaagt caaggaataa aaaaatagga gttataggaa ctccctgcaac cgtaaaaagc 360
 ggagcctacc agagaaagct tgaagagggg ggagctgatg tttttgcaaa ggctgtccc 420
 ctattcgttc cccttcgga ggaaggtctc cttgaggggg agataacaag aaaggttgta 480
 gaacactacc ttaaggagtt taaaggtaag attgatactc tgattttagg atgtacccat 540
 tacccccttc ttaaaaagga gataaagaag tttttgggag acgttgaagt cgttgactct 600
 tccgaagccc tttcccttc cctccataac tttataaag acgatgggtc ctcatccctt 660
 gaggattttt ttacggacct ttcccaaat ctccagtttt tgattaaatt aatactcggt 720
 agggattacc cggtaaaact tgcggagggg gtttttacac attaa 765

<210> 74
 <211> 255
 <212> PRT
 <213> Aquifex pyrophilus

<220>
 <221> misc feature
 <222> (255)..(255)
 <223> Xaa can be any naturally occurring amino acid

<400> 74

Met Lys Ile Gly Ile Phe Asp Ser Gly Val Gly Gly Leu Thr Val Leu
 1 5 10 15

Lys Ala Ile Arg Asn Arg Tyr Arg Lys Val Asp Ile Val Tyr Leu Gly
 20 25 30

Asp Thr Ala Arg Val Pro Tyr Gly Ile Arg Ser Lys Asp Thr Ile Ile
 35 40 45

Arg Tyr Ser Leu Glu Cys Ala Gly Phe Leu Lys Asp Lys Gly Val Asp
 50 55 60

Ile Ile Val Val Ala Cys Asn Thr Ala Ser Ala Tyr Ala Leu Glu Arg
 65 70 75 80

Leu Lys Lys Glu Ile Asn Val Pro Val Phe Gly Val Ile Glu Pro Gly
85 90 95

Val Lys Glu Ala Leu Lys Lys Ser Arg Asn Lys Lys Ile Gly Val Ile
100 105 110

Gly Thr Pro Ala Thr Val Lys Ser Gly Ala Tyr Gln Arg Lys Leu Glu
115 120 125

Glu Gly Gly Ala Asp Val Phe Ala Lys Ala Cys Pro Leu Phe Val Pro
130 135 140

Leu Ala Glu Glu Gly Leu Leu Glu Gly Glu Ile Thr Arg Lys Val Val
145 150 155 160

Glu His Tyr Leu Lys Glu Phe Lys Gly Lys Ile Asp Thr Leu Ile Leu
165 170 175

Gly Cys Thr His Tyr Pro Leu Leu Lys Lys Glu Ile Lys Lys Phe Leu
180 185 190

Gly Asp Val Glu Val Val Asp Ser Ser Glu Ala Leu Ser Leu Ser Leu
195 200 205

His Asn Phe Ile Lys Asp Asp Gly Ser Ser Ser Leu Glu Leu Phe Phe
210 215 220

Thr Asp Leu Ser Pro Asn Leu Gln Phe Leu Ile Lys Leu Ile Leu Gly
225 230 235 240

Arg Asp Tyr Pro Val Lys Leu Ala Glu Gly Val Phe Thr His Xaa
245 250 255

<210> 75
<211> 19
<212> DNA
<213> Artificial Primer Sequence

<220>
<223> Primer used to amplify the MuiI gene of *S. aureus* using genomic
DNA prepared from the ATCC 25923 type strain of *S. aureus*

<400> 75
tgatgaaca aatggacga

<210> 76
<211> 18
<212> DNA
<213> Artificial primer sequence

<220>
<223> Primer used to amplify the MurI gene of *S. aureus* using genomic DNA prepared from the ATCC 25923 type strain of *S. aureus*

<400> 76
ttacaatttg agccattc 18

<210> 77
<211> 62
<212> PRT
<213> *Staphylococcus aureus*

<400> 77
Ile Leu Pro Gly Ala Arg Ala Ala Val Lys Val Thr Lys Asn Asn Lys
1 5 10 15

Ile Gly Val Ile Gly Thr Leu Gly Thr Ile Lys Ser Ala Ser Tyr Asp
20 25 30

Ile Ala Ile Lys Ser Lys Ala Pro Ala Ile Glu Val Thr Ser Leu Ala
35 40 45

Cys Pro Lys Phe Val Pro Ile Val Glu Ser Asn Gln Tyr Arg
50 55 60

<210> 78
<211> 62
<212> PRT
<213> *Enterococcus faecalis*

<400> 78
Ile Glu Pro Gly Ala Arg Thr Ala Ile Met Thr Thr Arg Asn Gln Asn
1 5 10 15

Val Leu Val Leu Gly Thr Glu Gly Thr Ile Lys Ser Glu Ala Tyr Arg
20 25 30

Thr His Ile Lys Arg Ile Asn Pro His Val Glu Val His Gly Val Ala
35 40 45

Cys Pro Gly Phe Val Pro Leu Val Glu Gln Met Arg Tyr Ser

50

55

60

<210> 79
 <211> 49
 <212> PRT
 <213> *Staphylococcus aureus*

<400> 79

Ser Val Ala Lys Lys Ile Val Ala Glu Thr Leu Gln Ala Leu Gln Leu
 1 5 10 15

Lys Gly Leu Asp Thr Leu Ile Leu Gly Cys Thr His Tyr Pro Leu Leu
 20 25 30

Arg Pro Val Ile Gln Asn Val Met Gly Ser His Val Thr Leu Ile Asp
 35 40 45

Ser

<210> 80
 <211> 49
 <212> PRT
 <213> *Enterococcus faecalis*

<400> 80

Thr Val Ile Ser Ile Val Ile His Gln Thr Leu Lys Arg Trp Arg Asn
 1 5 10 15

Ser Glu Ser Asp Thr Val Ile Leu Gly Cys Thr His Tyr Pro Leu Leu
 20 25 30

Tyr Lys Pro Ile Tyr Asp Tyr Phe Gly Gly Lys Lys Thr Val Ile Ser
 35 40 45

Ser

<210> 81
 <211> 62
 <212> PRT
 <213> *Staphylococcus aureus*

<400> 81

Ile Leu Pro Gly Thr Arg Ala Ala Val Lys Lys Thr Gln Asn Lys Gln

1 5 10 15
 Val Gly Ile Ile Gly Thr Ile Gly Thr Val Lys Ser Gln Ala Tyr Glu
 20 25 30
 Lys Ala Leu Lys Glu Lys Val Pro Glu Leu Thr Val Thr Ser Leu Ala
 35 40 45
 Cys Pro Lys Phe Val Ser Val Val Glu Ser Asn Glu Tyr His
 50 55 60

 <210> 82
 <211> 62
 <212> PRT
 <213> Enterococcus faecalis

 <400> 82
 Ile Glu Pro Gly Ala Arg Thr Ala Ile Met Thr Thr Arg Asn Gln Asn
 1 5 10 15

 Val Leu Val Leu Gly Thr Glu Gly Thr Ile Lys Ser Glu Ala Tyr Arg
 20 25 30

 Thr His Ile Lys Arg Ile Asn Pro His Val Glu Val His Gly Val Ala
 35 40 45

 Cys Pro Gly Phe Val Pro Leu Val Glu Gln Met Arg Tyr Ser
 50 55 60

 <210> 83
 <211> 15
 <212> PRT
 <213> Staphylococcus aureus

 <400> 83
 Ser Val Ala Lys Lys Ile Val Ala Glu Thr Leu Ala Pro Leu Thr
 1 5 10 15

 <210> 84
 <211> 15
 <212> PRT
 <213> Enterococcus faecalis

 <400> 84
 Thr Val Ile Ser Ile Val Ile His Gln Thr Leu Lys Arg Trp Arg

1 5 10 15

 <210> 85
 <211> 32
 <212> PRT
 <213> *Staphylococcus aureus*

 <400> 85

 Lys Lys Ile Asp Thr Leu Ile Leu Gly Cys Thr His Tyr Pro Leu Leu
 1 5 10 15

 Arg Pro Ile Ile Gln Asn Val Met Gly Glu Asn Val Gln Leu Ile Asp
 20 25 30

 <210> 86
 <211> 32
 <212> PRT
 <213> *Enterococcus faecalis*

 <400> 86

 Ser Glu Ser Asp Thr Val Ile Leu Gly Cys Thr His Tyr Pro Leu Leu
 1 5 10 15

 Tyr Lys Pro Ile Tyr Asp Tyr Phe Gly Gly Lys Lys Thr Val Ile Ser
 20 25 30

 <210> 87
 <211> 111
 <212> PRT
 <213> *Staphylococcus aureus*

 <400> 87

 Ile Leu Pro Gly Thr Arg Ala Ala Val Lys Lys Thr Gln Asn Lys Gln
 1 5 10 15

 Val Gly Ile Ile Gly Thr Ile Gly Thr Val Lys Ser Gln Ala Tyr Glu
 20 25 30

 Lys Ala Leu Lys Glu Lys Val Pro Glu Leu Thr Val Thr Ser Leu Ala
 35 40 45

 Cys Pro Lys Phe Val Ser Val Val Glu Ser Asn Glu Tyr His Ser Ser
 50 55 60

 Val Ala Lys Lys Ile Val Ala Glu Thr Leu Ala Pro Leu Thr Thr Lys

65 70 75 80

Lys Ile Asp Thr Leu Ile Leu Gly Cys Thr His Tyr Pro Leu Leu Arg
 85 90 95

Val Leu Val Leu Gly Thr Glu Gly Thr Ile Lys Ser Glu Ala Tyr Arg
20 25 30

Thr His Ile Lys Arg Ile Asn Pro His Val Glu Val His Gly Val Ala
35 40 45

Cys Pro Gly Phe Val Pro Leu Val Glu Gln Met Arg Tyr Ser Asp
50 55 60

<210> 90
<211> 63
<212> PRT
<213> Enterococcus faecalis

<400> 90

Ile Leu Pro Gly Ala Arg Ala Ala Val Lys Val Thr Lys Asn Asn Lys
1 5 10 15

Ile Gly Val Ile Gly Thr Leu Gly Thr Ile Lys Ser Ala Ser Tyr Asp
20 25 30

Ile Ala Ile Lys Ser Lys Ala Pro Ala Ile Glu Val Thr Ser Leu Ala
35 40 45

Cys Pro Lys Phe Val Pro Ile Val Glu Ser Asn Gln Tyr Arg Ser
50 55 60

<210> 91
<211> 63
<212> PRT
<213> Enterococcus faecalis

<400> 91

Ile Leu Pro Gly Thr Arg Ala Ala Val Lys Lys Thr Gln Asn Lys Gln
1 5 10 15

Val Gly Ile Ile Gly Thr Ile Gly Thr Val Lys Ser Gln Ala Tyr Glu
20 25 30

Lys Ala Leu Lys Glu Lys Val Pro Glu Leu Thr Val Thr Ser Leu Ala
35 40 45

Cys Pro Lys Phe Val Ser Val Val Glu Ser Asn Glu Tyr His Ser
50 55 60

<210> 92
<211> 15
<212> PRT
<213> *Staphylococcus aureus*

<400> 92

Thr Val Ile Ser Ile Val Ile His Gln Thr Leu Lys Arg Trp Arg
1 5 10 15

<210> 93
<211> 15
<212> PRT
<213> *Enterococcus faecalis*

<400> 93

Ser Val Ala Lys Lys Ile Val Ala Glu Thr Leu Gln Ala Leu Gln
1 5 10 15

<210> 94
<211> 15
<212> PRT
<213> *Enterococcus faecalis*

<400> 94

Ser Val Ala Lys Lys Ile Val Ala Glu Thr Leu Ala Pro Leu Thr
1 5 10 15

<210> 95
<211> 32
<212> PRT
<213> *Staphylococcus aureus*

<400> 95

Ser Glu Ser Asp Thr Val Ile Leu Gly Cys Thr His Tyr Pro Leu Leu
1 5 10 15

Tyr Lys Pro Ile Tyr Asp Tyr Phe Gly Gly Lys Lys Thr Val Ile Ser
20 25 30

<210> 96
<211> 32
<212> PRT
<213> *Enterococcus faecalis*

<400> 96

Lys Gly Leu Asp Thr Leu Ile Leu Gly Cys Thr His Tyr Pro Leu Leu

1	5	10	15
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Arg	Pro	Val	Ile	Gln	Asn	Val	Met	Gly	Ser	His	Val	Thr	Leu	Ile	Asp
			20					25					30		

<210> 97
 <211> 32
 <212> PRT
 <213> Enterococcus faecalis

<400> 97

Lys	Lys	Ile	Asp	Thr	Leu	Ile	Leu	Gly	Cys	Thr	His	Tyr	Pro	Leu	Leu
1			5					10						15	

Arg	Pro	Ile	Ile	Gln	Asn	Val	Met	Gly	Glu	Asn	Val	Gln	Leu	Ile	Asp
			20					25					30		